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Ueno

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(54) **IMAGE FORMING APPARATUS FOR COOLING A SURFACE OF A RECORDING MEDIUM**

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(52) **U.S. Cl.**
CPC ***G03G 21/206*** (2013.01)

(58) **Field of Classification Search**
CPC G03G 21/206; G03G 2221/1645
USPC 399/92
See application file for complete search history.

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(57) **ABSTRACT**

An image forming apparatus includes a housing; an image forming section that is provided within the housing and forms an image onto a recording medium; an output section that outputs the recording medium, having the image formed thereon by the image forming section, outward from the housing; a loading section on which the recording medium output from the output section is loaded and that is provided with an air hole; and a cooling unit that allows air to flow between an interior of the housing and the loading section via the air hole so as to cool a surface, which faces the loading section, of the recording medium loaded on the loading section.

3 Claims, 7 Drawing Sheets

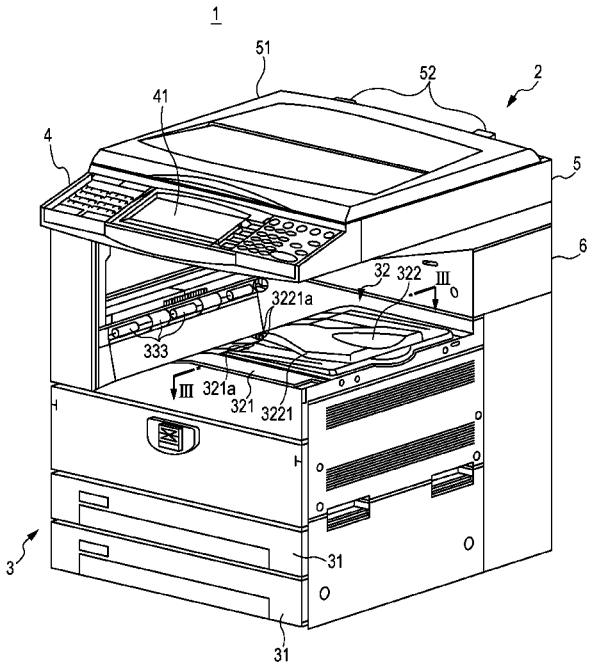


FIG. 1

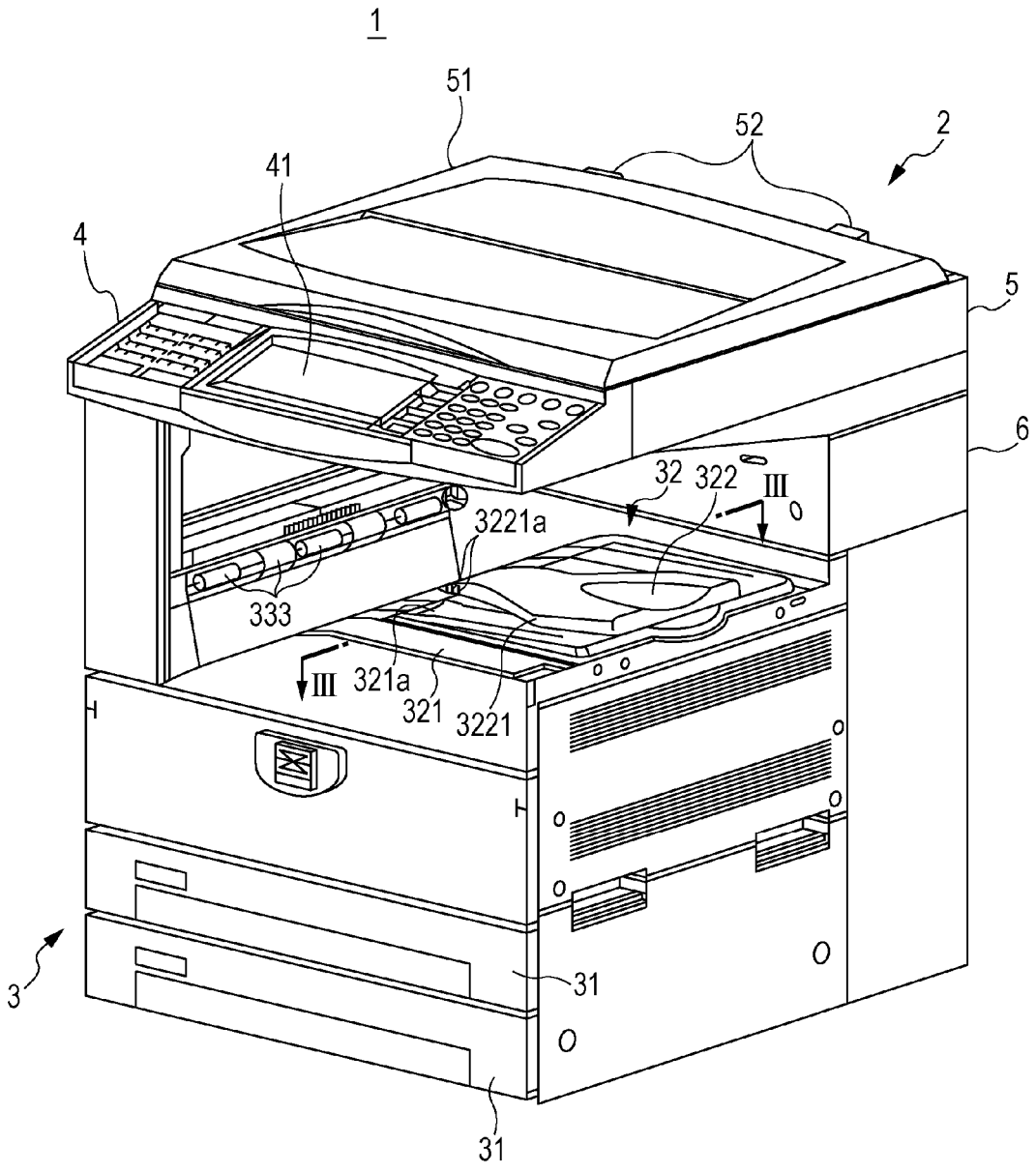


FIG. 2

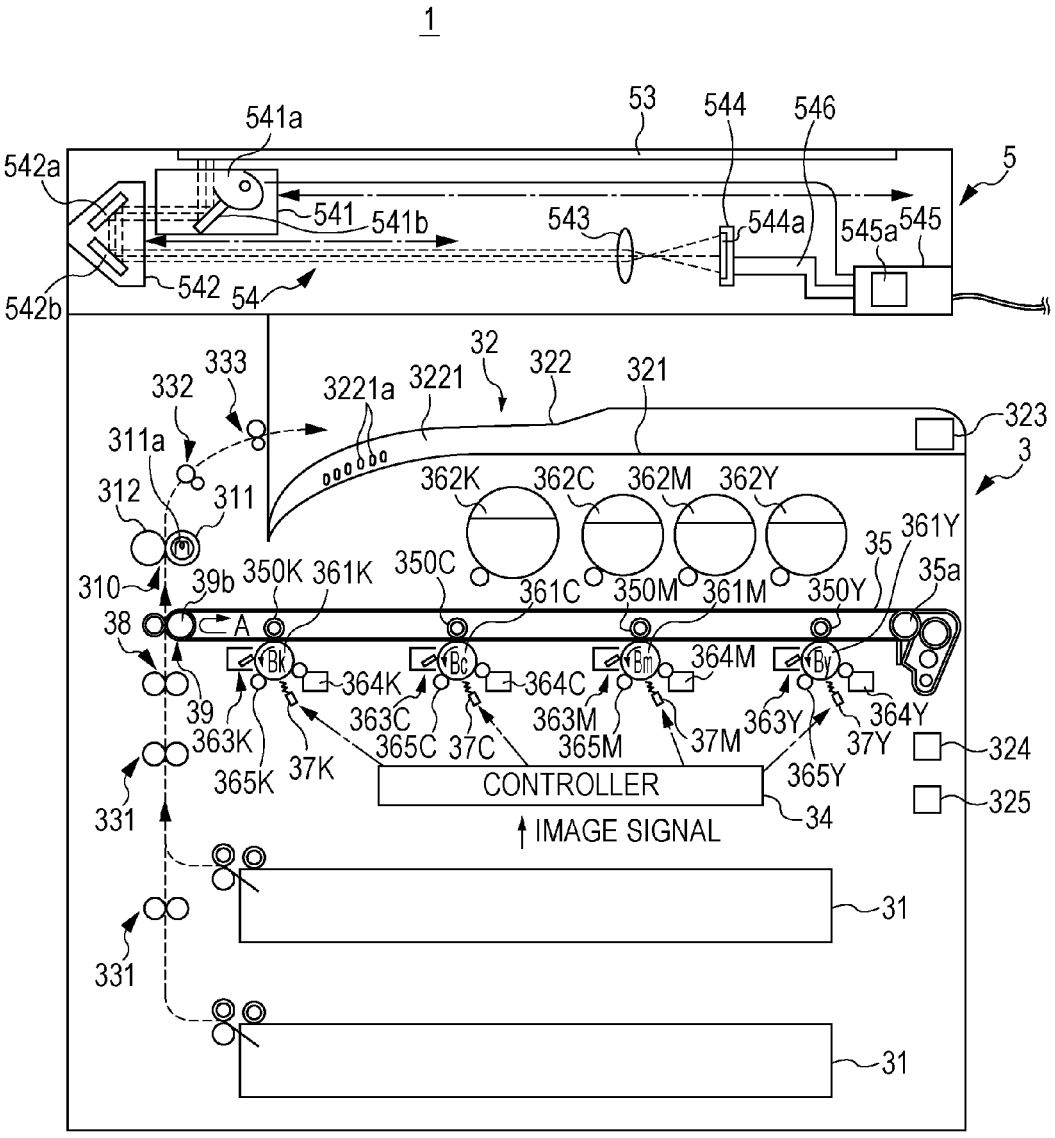

1
541a
53
544
546
542a
5
541
541b
543
544a
545a
545
542b
542
54
32
333
332
3221a
3221
322
321
323
311a
3
362K
362C
362M
362Y
312
311
361Y
35
310
39b
350K
361K
350C
361C
350M
361M
350Y
35a
38
A
Bk
Bc
Bm
By
364M
364K
364C
39
363K
363C
363M
363Y
364Y
365C
37C
365M
37M
37Y
324
365K
37K
CONTROLLER
365Y
331
34
IMAGE SIGNAL
325
31
331
31

FIG. 3

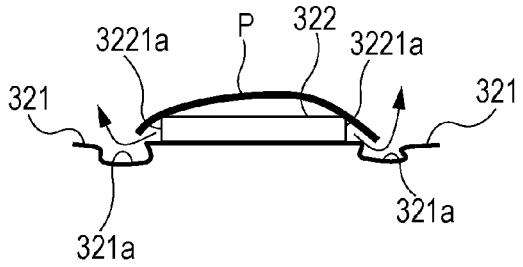

3221a
P
322
3221a
321
321
321a
321a

FIG. 4

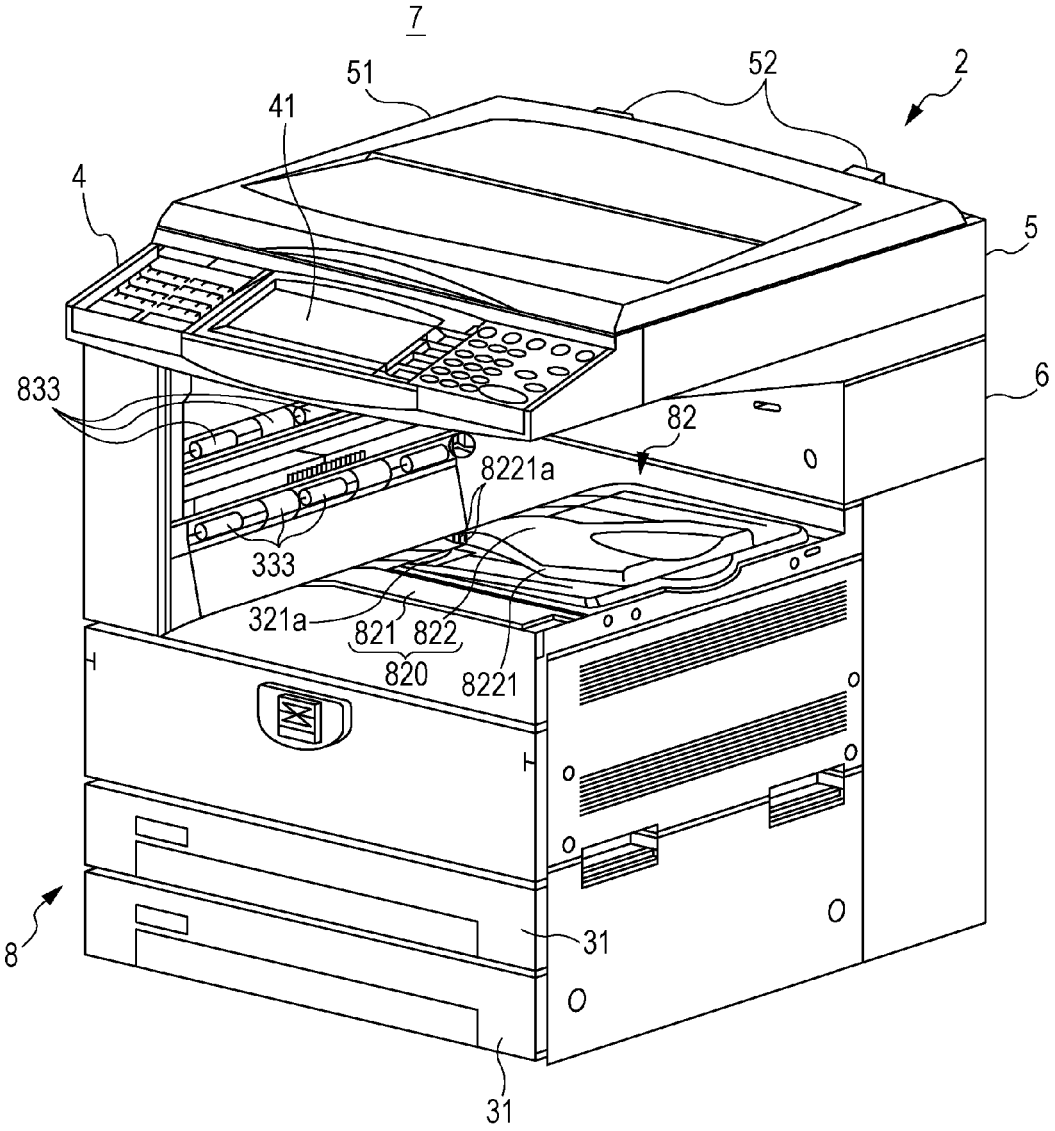
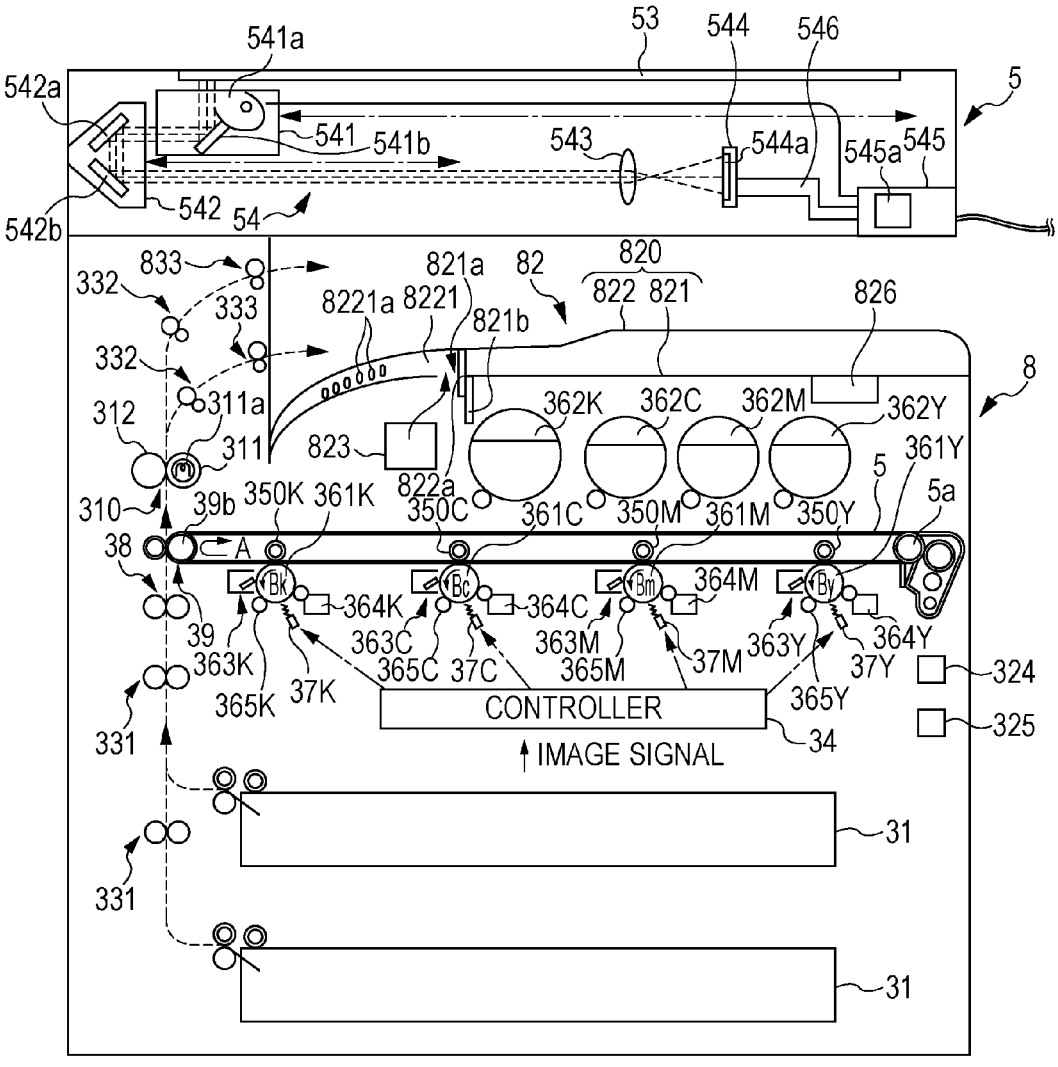

7
51
52
2
41
4
5
6
833
82
8221a
333
321a
821
822
820
8221
8
31
31

FIG. 5


7
541a
53
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546
542a
5
541
541b
543
544a
545a
545
542b
542
54
833
821a
82
820
822
821
826
332
333
8221a
8221
821b
332
8
311a
362K
362C
362M
362Y
312
311
823
361Y
5
310
39b
350K
361K
822a
350C
361C
350M
361M
350Y
5a
38
A
Bk
Bc
Bm
By
364K
364C
364M
39
363K
363C
365C
37C
363M
365M
37M
363Y
37Y
364Y
324
365K
37K
CONTROLLER
365Y
325
331
34
IMAGE SIGNAL
31
331
31

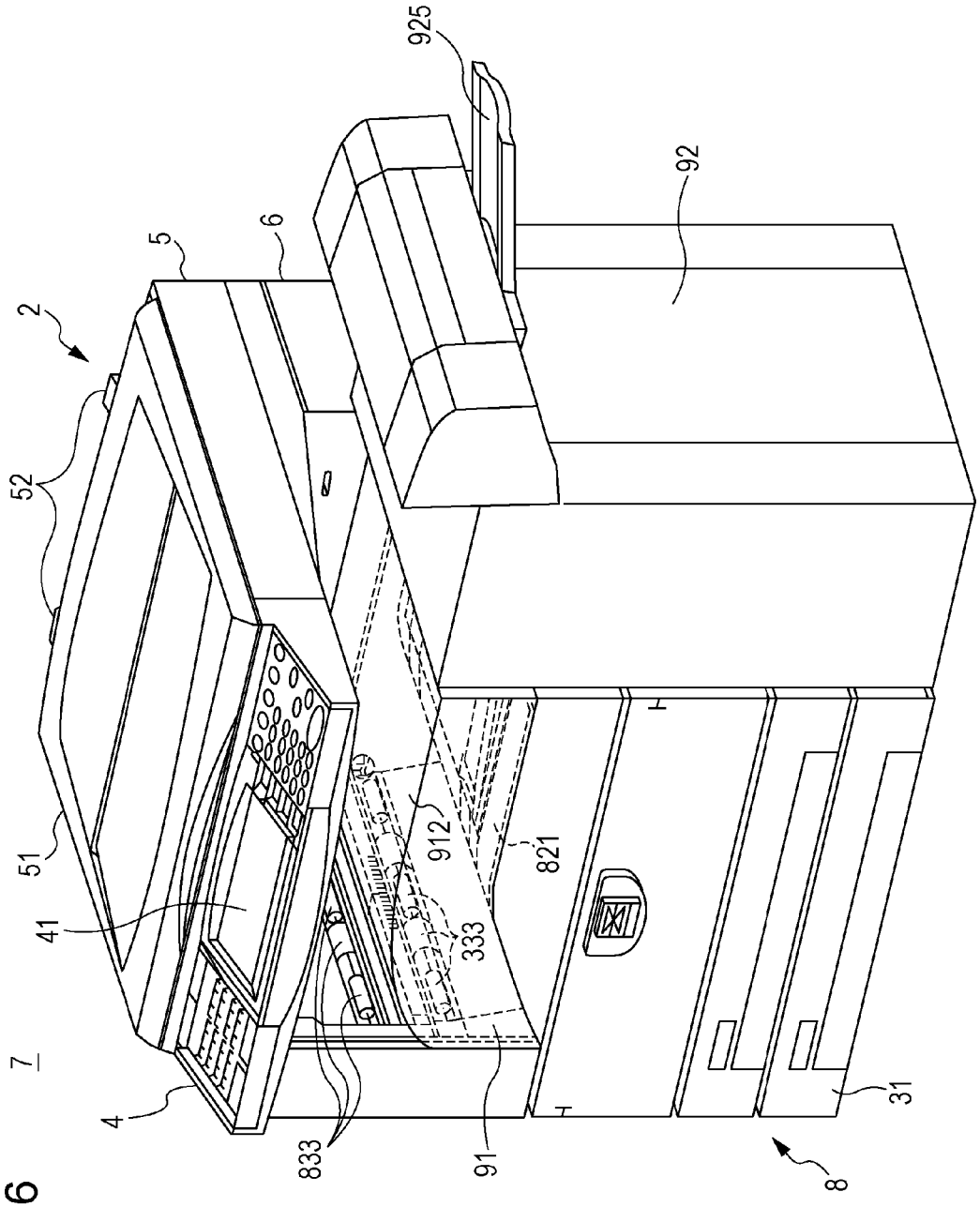

FIG. 6

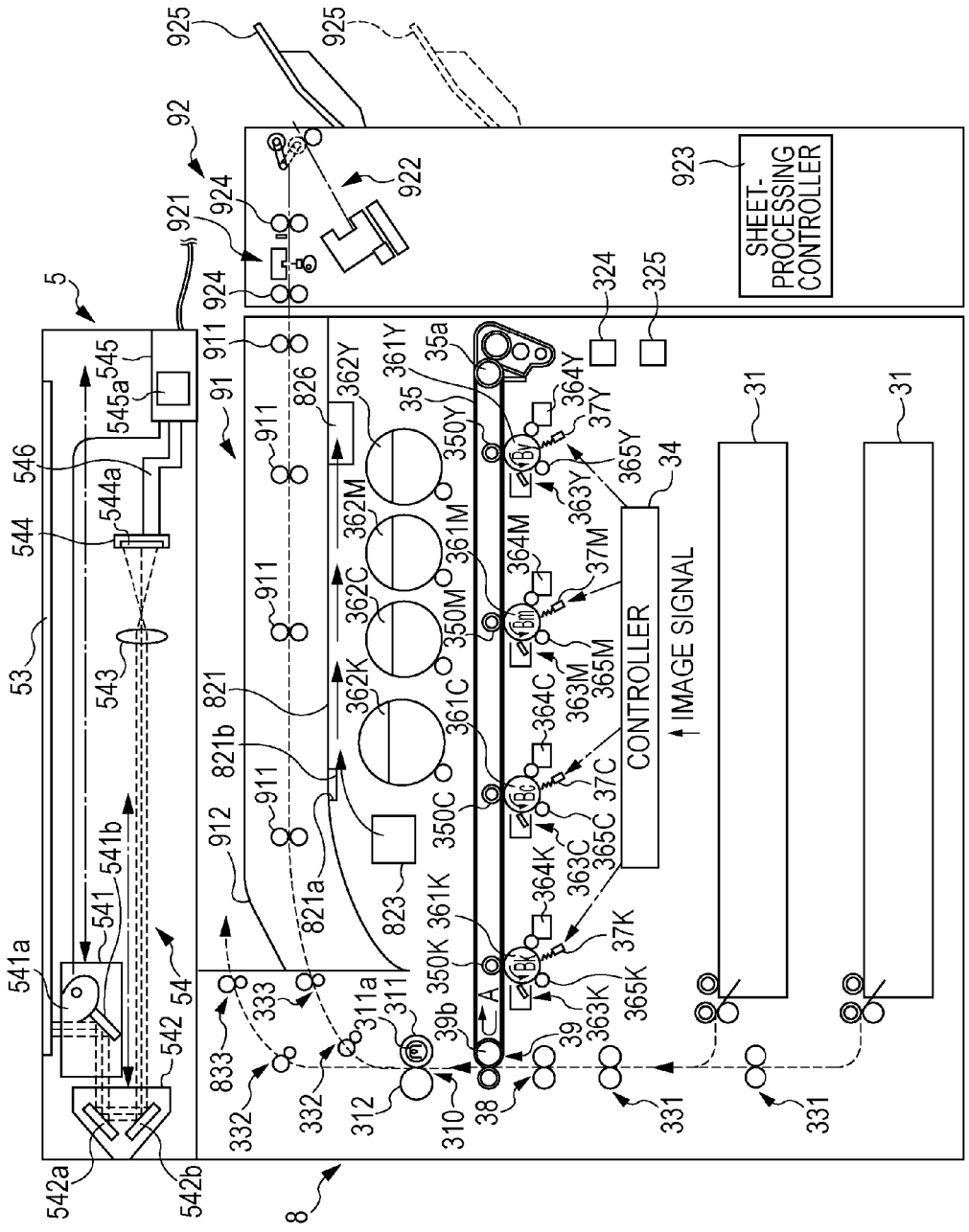
925
925
92
921
924
922
923
SHEET-PROCESSING CONTROLLER
5
924
911
91
826
362Y
361Y
35a
324
325
545
545a
546
544a
544
911
362M
35
350Y
364Y
37Y
365Y
34
31
31
53
543
911
362C
361M
364M
37M
363Y
911
362K
361C
350M
364C
363M
365M
821
821b
CONTROLLER
IMAGE SIGNAL
541b
912
911
350C
37C
365C
363C
541
823
361K
364K
37K
541a
821a
350K
365K
363K
54
542
333
311a
311
39b
39
833
332
332
312
310
38
331
331
542a
542b
8
7
A

FIG. 7

FIG. 8

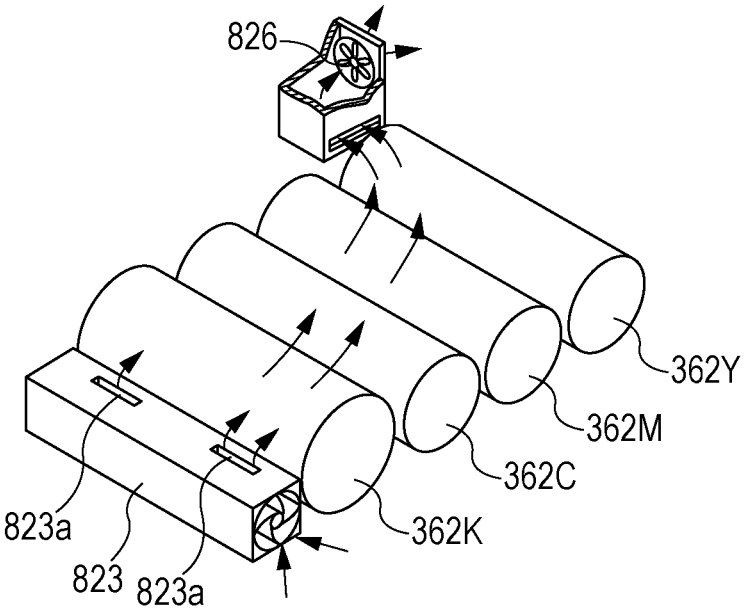

FIG. 9

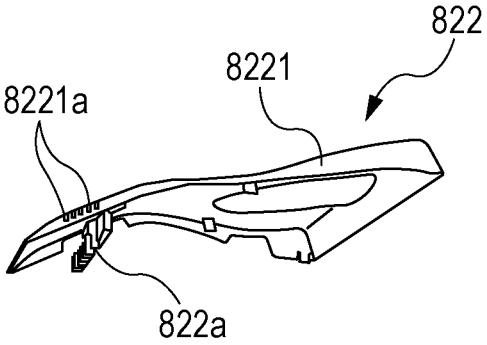

IMAGE FORMING APPARATUS FOR COOLING A SURFACE OF A RECORDING MEDIUM

CROSS-REFERENCE TO RELATED APPLICATIONS

This application is based on and claims priority under 35 USC 119 from Japanese Patent Application No. 2012-245372 filed Nov. 7, 2012.

BACKGROUND

Technical Field

The present invention relates to image forming apparatuses.

SUMMARY

According to an aspect of the invention, there is provided an image forming apparatus including a housing; an image forming section that is provided within the housing and forms an image onto a recording medium; an output section that outputs the recording medium, having the image formed thereon by the image forming section, outward from the housing; a loading section on which the recording medium output from the output section is loaded and that is provided with an air hole; and a cooling unit that allows air to flow between an interior of the housing and the loading section via the air hole so as to cool a surface, which faces the loading section, of the recording medium loaded on the loading section.

BRIEF DESCRIPTION OF THE DRAWINGS

Exemplary embodiments of the present invention will be described in detail based on the following figures, wherein:

FIG. **1** is an external view of an image forming apparatus according to a first exemplary embodiment of the present invention;

FIG. **2** schematically illustrates the configuration of the image forming apparatus shown in FIG. **1**;

FIG. **3** is a vertical sectional view taken along line III-III in FIG. **1**;

FIG. **4** is an external view of an image forming apparatus according to a second exemplary embodiment of the present invention;

FIG. **5** schematically illustrates the configuration of the image forming apparatus shown in FIG. **4**;

FIG. **6** is an external view of an apparatus including the image forming apparatus shown in FIGS. **4** and **5** equipped with a sheet transport device and a post-processing device connected to the image forming apparatus;

FIG. **7** schematically illustrates the configuration of the apparatus shown in FIG. **6**;

FIG. **8** is a perspective view illustrating the relationships among an air blower, four toner cartridges, and an exhaust fan; and

FIG. **9** is a perspective view of an auxiliary loading member, as viewed at an angle from below.

DETAILED DESCRIPTION

Exemplary embodiments of the present invention will be described below with reference to the drawings.

FIG. **1** is an external view of an image forming apparatus according to a first exemplary embodiment of the present invention.

An image forming apparatus **1** shown in FIG. **1** is a digital multifunction apparatus having a printing function, a scanning function, and a photocopying function. The image forming apparatus **1** includes an image reader **2** that reads a document image, an image forming unit **3** that forms an image onto a sheet, and an operable section **4**.

The image reader **2** includes an image reading unit **5** and a supporter **6** that supports the image reading unit **5**. The image reading unit **5** is attached above the image forming unit **3** via the supporter **6**.

The operable section **4** is to be operated by an operator for inputting a copy start command or information related to the number of copies, and is attached to an edge of the image reading unit **5**. The operable section **4** includes a display screen **41** that displays setting contents and operation contents.

A cover **51** is provided at an upper portion of the image reading unit **5**. The cover **51** is rotatably attached to a rear edge of the image reading unit **5** via a hinge **52** so that the cover **51** is openable and closable relative to the image reading unit **5**. Platen glass **53** (see FIG. **2**) serving as a read surface on which a document sheet is placed is provided under the cover **51**.

The image forming unit **3** is configured to form an image onto a sheet and achieves a copying function by forming an image corresponding to a document image read by the image reading unit **5** onto a sheet. Sheet trays **31** that accommodate sheets onto which images are to be formed are provided at a lower portion of the image forming unit **3**. An output tray **32** onto which a sheet having an image formed thereon and output by a pair of output rollers **333** is loaded is provided at an upper portion of the image forming unit **3**. The image forming unit **3** forms an image onto a sheet accommodated in one of the sheet trays **31** by electrophotography and outputs the sheet onto the output tray **32**. This will be described in detail later. The image forming unit **3** corresponds to an example of an image forming section according to an exemplary embodiment of the present invention. The image reading unit **5** is disposed above the image forming unit **3** with a gap therebetween through which a sheet loaded on the output tray **32** is retrievable by an operator.

In the image forming apparatus **1** having the above-described configuration, for example, when an operator opens the cover **51** at the upper portion of the image reading unit **5**, places a document sheet on the platen glass **53** (see FIG. **2**), and inputs copy start information by operating the operable section **4**, the image reading unit **5** reads a document image from the document sheet placed on the platen glass **53** (see FIG. **2**), and the image forming unit **3** forms an image corresponding to the document image read by the image reading unit **5** onto a sheet accommodated in one of the sheet trays **31**. Then, the sheet having the image formed thereon is loaded onto the output tray **32**.

FIG. **2** schematically illustrates the configuration of the image forming apparatus **1** shown in FIG. **1**.

First, the schematic configuration of the image reading unit **5** in the image forming apparatus **1** will be described.

In FIG. **2**, the schematic configuration inside the image reading unit **5** is shown, as viewed from the front side thereof, in a state where the cover **51** (see FIG. **1**) is removed. The image reading unit **5** includes the platen glass **53** on which a document sheet is placed, and an image reading mechanism **54** for reading an image. The image reading mechanism **54** includes a first carriage **541** that moves below the platen glass

53 along the platen glass 53, and a second carriage 542 that moves in accordance with the first carriage 541. The first carriage 541 has a light radiating section 541*a* that radiates light toward the platen glass 53, and a first reflecting mirror 541*b* that reflects light reflected by and returning from the document sheet on the platen glass 53 so as to change the traveling direction of the reflected light. The second carriage 542 has a second reflecting mirror 542*a* that reflects the reflected light reflected by the first reflecting mirror 541*b*, and a third reflecting mirror 542*b* that further reflects the reflected light reflected by the second reflecting mirror 542*a*. The first carriage 541 and the second carriage 542 are movable back and forth in the left-right direction by a stepping motor (not shown). The image reading mechanism 54 further includes a lens 543 that converges the reflected light reflected by the third reflecting mirror 542*b*; a signal output section 544 equipped with a charge coupled device (CCD) 544*a* that receives the converged light, converts the received light into an electrical image signal, and outputs the image signal; and a signal processing section 545 equipped with a processing circuit 545*a* that receives the image signal output from the signal output section 544 and performs image processing on the image signal. Furthermore, a signal transmission path 546 that transmits the image signal from the signal output section 544 to the signal processing section 545 is provided between the signal output section 544 and the signal processing section 545. The image reading mechanism 54 moves the first and second carriages 541 and 542 having the reflecting mirrors 541*b*, 542*a*, and 542*b* attached thereto and scans the document sheet placed on the platen glass 53 in the left-right direction so as to read the document image.

Next, the schematic configuration of the image forming unit 3 in the image forming apparatus 1 will be described.

The image forming unit 3 shown in FIG. 2 is of a full-color tandem type. The image forming unit 3 is capable of forming an image onto a resinous recording medium, such as an overhead projector sheet as a representative example, in addition to an ordinary sheet, that is, a paper recording medium. The following description is directed to a case where a paper recording medium is used as a representative example of a sheet, unless otherwise noted.

The image forming unit 3 includes electrophotographic multilayer image bearing members 361K, 361C, 361M, and 361Y that rotate in directions indicated by an arrow Bk, an arrow Bc, an arrow Bm, and an arrow By, respectively. The image bearing members 361K, 361C, 361M, and 361Y are respectively surrounded by roller-shaped charging members 365K, 365C, 365M, and 365Y, light-emitting-diode print heads (LPHs) 37K, 37C, 37M, and 37Y, and developing devices 364K, 364C, 364M, and 364Y. Specifically, each charging member electrostatically charges the corresponding image bearing member while being in contact with the image bearing member and being rotated by the rotation of the image bearing member. The LPHs 37K, 37C, 37M, and 37Y irradiate the respective electrostatically-charged image bearing members 361K, 361C, 361M, and 361Y with exposure light beams based on image signals, which are emitted by multiple arranged light emitting diodes (LEDs), so as to form black (K), cyan (C), magenta (M), and yellow (Y) electrostatic latent images having potentials different from the ambient potential. Each developing device develops the electrostatic latent image on the corresponding image bearing member by electrostatically adhering an electrostatically-charged toner of the corresponding color thereto so as to form a toner image. The four developing devices 364K, 364C, 364M, and 364Y are supplied with toners of the respective colors from four toner cartridges 362K, 362C, 362M, and 362Y by mechanisms (not shown). Furthermore, the image forming unit 3 also includes an intermediate transfer belt 35 onto which the toner images of the respective colors formed on the image bearing members are transferred (first-transferred) and that transports the first-transfer toner images, cleaning devices 363K, 363C, 363M, and 363Y that remove residual toner from the image bearing members by using cleaning blades, first-transfer rollers 350K, 350C, 350M, and 350Y where the toner images of the respective colors are first-transferred onto the intermediate transfer belt 35, and a pair of second-transfer rollers 39 where the first-transfer toner images on the intermediate transfer belt 35 are second-transferred onto a sheet. The intermediate transfer belt 35 receives a driving force from a driving roller 35*a* and rotates in a direction indicated by an arrow A while being extended between the second-transfer roller 39*b* and the driving roller 35*a*. The image forming unit 3 also includes a fixing device 310 that fixes the second-transfer toner image, which has been transferred on the sheet but not fixed thereon yet, onto the sheet. The fixing device 310 includes a fixing roller 311 having a heating mechanism 311*a*, and a pressing roller 312 that is disposed facing the fixing roller 311 and that applies pressure onto the sheet. Furthermore, the image forming unit 3 includes a controller 34 that controls the components, including the LPHs 37K, 37C, 37M, and 37Y, in the image forming unit 3. An image signal that has been processed by the processing circuit 545*a* of the signal processing section 545 is input to the controller 34. For example, the controller 34 processes the input image signal, converts the image signal into an image signal based on which each LPH for the corresponding color forms an electrostatic latent image corresponding to an image expressed by the image signal, and sends the converted image signal to the LPH so as to make the LPH form the electrostatic latent image. Furthermore, the image forming unit 3 also includes the sheet trays 31 that accommodate sheets onto which images are to be formed, the pair of output rollers 333 that output a sheet having an image formed thereon, and the output tray 32 onto which the sheet output by the pair of output rollers 333 is loaded. The pair of output rollers 333 correspond to an example of an output section according to an exemplary embodiment of the present invention. The output tray 32 corresponds to an example of a loading section according to an exemplary embodiment of the present invention.

Next, an image forming operation performed in the image forming unit 3 will be described.

The four image bearing members 361K, 361C, 361M, and 361Y are electrostatically charged by the charging members 365K, 365C, 365M, and 365Y, respectively, and are irradiated with exposure light beams based on image signals radiated from the LEDs of the LPHs 37K, 37C, 37M, and 37Y, respectively, whereby electrostatic latent images are formed on the image bearing members 361K, 361C, 361M, and 361Y. The developing devices 364K, 364C, 364M, and 364Y develop the formed electrostatic latent images by using developers containing toners of the respective colors, thereby forming toner images of the respective colors. At the first-transfer rollers 350K, 350C, 350M, and 350Y corresponding to the respective colors, the toner images of the respective colors formed in this manner are sequentially transferred (first-transferred) and superposed onto the intermediate transfer belt 35 in the following order: yellow (Y), magenta (M), cyan (C), and black (K). As a result, a multicolor first-transfer toner image is formed. Then, the multicolor first-transfer toner image is transported to the pair of second-transfer rollers 39 by the intermediate transfer belt 35. In concert with the formation of the multicolor first-transfer toner image, a sheet is

fed from one of the sheet trays **31** and is transported to a pair of first transport rollers **331**, and moreover, the orientation of the sheet is adjusted by a pair of registration rollers **38**. Subsequently, the pair of second-transfer rollers **39** transfer (second-transfer) the aforementioned multicolor first-transfer toner image onto the transported sheet. Then, the fixing device **310** fixes the second-transfer toner image onto the sheet. More specifically, the sheet is transported between the fixing roller **311** and the pressing roller **312** that face each other in the fixing device **310**. The toners constituting the second-transfer toner image, which is formed on the sheet but not fixed thereon yet, are fused by the heating mechanism **311***a* of the fixing roller **311**, whereby a fixed image formed of a fixed toner image is formed on the sheet. In this case, a sheet transport path is indicated by an upward dotted arrow in FIG. **2**.

After the second-transfer toner image is fixed onto the sheet by the fixing device **310**, the sheet travels through a pair of second transport rollers **332** and the pair of output rollers **333** and is output onto the output tray **32**, as indicated by a rightward dotted arrow in FIG. **2**.

The above description relates to the image forming operation performed in the image forming unit **3**.

Because the sheet output by the pair of output rollers **333** has been heated by the heating mechanism **311***a* when traveling through the fixing device **310**, the sheet carries heat. Therefore, when the image forming operation is performed consecutively on multiple sheets, the sheets are loaded onto the output tray **32** in a state where the heat-carrying sheets are closely in contact with each other. This may sometimes result in the occurrence of so-called sheet blocking in which the sheets become attached to each other due to re-fusing of the toner on the sheets caused by the heat.

In view of this, a countermeasure for preventing the occurrence of sheet blocking is provided in the image forming apparatus **1** according to the first exemplary embodiment.

The following description with reference to FIGS. **1** and **2** relates to the countermeasure for preventing the occurrence of sheet blocking.

The output tray **32** provided in the image forming unit **3** of the image forming apparatus **1** has a loading surface **321** provided with a protrusion **322** thereon. The protrusion **322** has protruding side portions **3221** provided with air holes **3221***a*. The loading surface **321** also has recesses **321***a* that are recessed downward at positions where air blown out from the air holes **3221***a* strikes. The protrusion **322** may be attachable to and detachable from the loading surface **321**, or may be integrated with the loading surface **321**.

FIG. **3** is a vertical sectional view taken along line III-III in FIG. **1**.

As shown in FIG. **3**, air blown out from the air holes **3221***a* is dispersed by the recesses **321***a* so that the air strikes a wide area of a sheet P loaded on the output tray **32**.

Referring back to FIGS. **1** and **2**, the description of the countermeasure for preventing the occurrence of sheet blocking will continue below.

The image forming unit **3** is provided with an air blower **323** at the underside of the protrusion **322**, which is a dead space. The air blower **323** is constituted of a direct-current (DC) motor and a fan. The fan is rotated by receiving a driving force from the motor and sends air toward the underside of the protrusion **322** so that the air is blown out from the air holes **3221***a*. The air blower **323** is of an airflow adjustable type. The air blower **323** corresponds to an example of a cooling unit according to an exemplary embodiment of the present invention.

Furthermore, the image forming unit **3** includes a temperature sensor **324** that measures the ambient temperature.

The image forming unit **3** also includes a counter **325** that counts the number of sheets output from the pair of output rollers **333**.

The controller **34** provided in the image forming unit **3** controls the operation of the air blower **323**. More specifically, since sheet blocking tends to occur more frequently as the number of sheets loaded on the output tray **32** increases, the controller **34** actuates the air blower **323** when the number of sheets counted by the counter **325** is 100 or more. Moreover, since sheet blocking tends to occur more frequently as the ambient temperature increases, the controller **34** actuates the air blower **323** when the ambient temperature measured by the temperature sensor **324** is 32° C. or higher. After actuating the air blower **323**, the controller **34** increases the amount of air sent from the air blower **323** as the number of sheets counted by the counter **325** increases. Specifically, the controller **34** increases an average voltage supplied to the DC motor so as to rotate the fan at higher speed, thereby increasing the amount of air sent from the air blower **323**.

With the image forming apparatus **1** according to the first exemplary embodiment, the sheets output by the pair of output rollers **333** and loaded onto the output tray **32** are cooled by the air blown out from the air holes **3221***a*, whereby the occurrence of sheet blocking may be prevented. Furthermore, in the image forming apparatus **1** according to the first exemplary embodiment, the air blower **323** is actuated when the number of output sheets is 100 or more. Therefore, when the number of output sheets is smaller than 100, a state where the sheets loaded on the output tray **32** are scattered about on the output tray **32** due to air blown out from the air holes **3221***a*, that is, a poorly accommodated state of the sheets loaded on the output tray **32**, may reliably be avoided. Furthermore, in the image forming apparatus **1** according to the first exemplary embodiment, the air blower **323** is actuated when the ambient temperature is 32° C. or higher, so that power consumption may be reduced. Moreover, in the image forming apparatus **1** according to the first exemplary embodiment, the amount of air sent from the air blower **323** is increased with increasing number of output sheets, whereby a good accommodated state of the sheets loaded on the output tray **32** may be achieved.

The description of the image forming apparatus **1** according to the first exemplary embodiment of the present invention ends here. The following description relates to an image forming apparatus according to a second exemplary embodiment of the present invention. In the second exemplary embodiment, the countermeasure for preventing the occurrence of sheet blocking is different from that in the first exemplary embodiment described above.

In the following description, elements that are similar to those in the first exemplary embodiments are given the same reference numerals, and redundant descriptions will be omitted. The following description is directed to differences from the first exemplary embodiment.

FIG. **4** is an external view of the image forming apparatus according to the second exemplary embodiment of the present invention. FIG. **5** schematically illustrates the configuration of the image forming apparatus shown in FIG. **4**.

An image forming unit **8** in an image forming apparatus **7** shown in FIGS. **4** and **5** includes an output tray **82** in place of the output tray **32** (see FIGS. **1** and **2**) described above. The output tray **82** has a configuration different from that of the output tray **32**. More specifically, the output tray **82** has a loading plate **821** and an auxiliary loading member **822** that is disposed on the loading plate **821** and that serves as the

protrusion in the first exemplary embodiment. When disposed on the loading plate **821**, the auxiliary loading member **822** protrudes upward and is inclined downward with decreasing distance to the pair of output rollers **333**. The auxiliary loading member **822** has side portions **8221** provided with air holes **8221***a*. A loading surface **820** is formed by the auxiliary loading member **822** and an area on the upper surface of the loading plate **821** that is located away from the auxiliary loading member **822**. The output tray **82** corresponds to an example of a loading section according to an exemplary embodiment of the present invention.

In addition to the pair of output rollers **333** (see FIGS. **1** and **2**) described above, the image forming unit **8** includes a pair of second output rollers **833** disposed above the pair of output rollers **333**. A combination of the pair of output rollers **333** and the pair of second output rollers **833** corresponds to an example of an output section according to an exemplary embodiment of the present invention.

FIG. **6** is an external view of an apparatus including the image forming apparatus **7** shown in FIGS. **4** and **5** equipped with a sheet transport device and a post-processing device connected to the image forming apparatus **7**. FIG. **7** schematically illustrates the configuration of the apparatus shown in FIG. **6**.

As shown in FIGS. **6** and **7**, in place of the auxiliary loading member **822** (see FIGS. **4** and **5**), a sheet transport device **91** may be installed on the upper surface of the loading plate **821** in the image forming apparatus **7**. Specifically, the sheet transport device **91** has pairs of third transport rollers **911** therein by which a sheet output by the pair of output rollers **333** toward the output tray **82** is transported further downstream. Furthermore, the image forming apparatus **7** is connectable to a post-processing device **92** that receives the sheet transported via the sheet transport device **91** and that performs post-processing on the sheet. FIGS. **6** and **7** illustrate a state where the image forming apparatus **7** is equipped with the sheet transport device **91** and is connected to the post-processing device **92**. As shown in FIG. **7**, the post-processing device **92** includes a puncher **921**, a stapler **922**, and a sheet-processing controller **923** that controls the operation of the puncher **921** and the stapler **922** and that communicates with the image forming apparatus **7**. The sheet entering the post-processing device **92** is transported by pairs of fourth transport rollers **924**. When there is a command for forming punched holes along an edge of the sheet, the puncher **921** is actuated. Then, the sheet having the punched holes formed therein is further transported so as to be output onto a sheet tray **925**. The sheet tray **925** is movable in the vertical direction between a position indicated by a solid line and a position indicated by a dashed line in FIG. **7**, and is sequentially lowered in accordance with the overall thickness of sheets sequentially loaded on the sheet tray **925**. When there is a command for binding together a stack of sheets by using the stapler **922** equipped in the post-processing device **92**, the stapler **922** is actuated so that a stapling operation is performed. In the apparatus including the image forming apparatus **7** equipped with the sheet transport device **91** and the post-processing device **92** connected to the image forming apparatus **7**, if there is no command for performing post-processing in the apparatus, a sheet having an image formed thereon passes through the pair of second output rollers **833** so as to be output onto an upper surface **912** of the sheet transport device **91**. The sheet transport device **91** corresponds to an example of a transport device according to an exemplary embodiment of the present invention. The post-processing device **92** corresponds to an example of a post-processing device according to an exemplary embodiment of the present invention.

As shown in FIGS. **5** and **7**, the four toner cartridges **362**K, **362**C, **362**M, and **362**Y accommodating the toners to be used in the image forming operation by the image forming unit **8** are disposed at the underside of the loading plate **821**.

Furthermore, as shown in FIGS. **5** and **7**, in place of the air blower **323** (see FIG. **2**) described above, the image forming unit **8** includes an air blower **823** that is disposed at the underside of the loading plate **821** between the toner cartridge **362**K and the fixing device **310**. Moreover, an exhaust fan **826** for exhausting air outside the apparatus is provided at the back side of the toner cartridge **362**Y in the traveling direction of the exhaust air.

As described above, because a sheet output by the pair of output rollers **333** has been heated by the heating mechanism **311***a* when traveling through the fixing device **310**, the sheet carries heat. When an image forming operation and post-processing are performed in the apparatus including the image forming apparatus **7** equipped with the sheet transport device **91** and the post-processing device **92** connected to the image forming apparatus **7**, the heat-carrying sheet is transported through the sheet transport device **91**. The sheet transport device **91** is installed on the upper surface of the loading plate **821**, and the four toner cartridges **362**K, **362**C, **362**M, and **362**Y are disposed at the underside of the loading plate **821**. Therefore, when an image forming operation and post-processing are performed consecutively on multiple sheets, the heat carried by the sheets transported through the sheet transport device **91** may be transmitted to the four toner cartridges **362**K, **362**C, **362**M, and **362**Y, possibly resulting in a problem where the toners become fixed within the toner cartridges **362**K, **362**C, **362**M, and **362**Y. The air blower **823** and the exhaust fan **826** in the image forming unit **8** are provided as a countermeasure for preventing such a problem.

Specifically, as shown in FIGS. **6** and **7**, in the state where the sheet transport device **91** is installed in the image forming apparatus **7** and the post-processing device **92** is connected thereto, the air blower **823** cools the four toner cartridges **362**K, **362**C, **362**M, and **362**Y by blowing air toward the underside of the loading plate **821**.

FIG. **8** is a perspective view illustrating the relationships among the air blower **823**, the four toner cartridges **362**K, **362**C, **362**M, and **362**Y, and the exhaust fan **826**.

As shown in FIG. **8**, a side surface located at the upper side of the air blower **823** is provided with rectangular air outlets **823***a* that are spaced apart from each other in the lengthwise direction of the air blower **823**. As indicated by arrows in FIG. **8**, air flowing out from the air outlets **823***a* of the air blower **823** forms an air flow path extending diagonally above the four toner cartridges **362**K, **362**C, **362**M, and **362**Y and is discharged outside the apparatus by the exhaust fan **826**. Therefore, in the image forming apparatus **7**, fixation of the toners within the toner cartridges **362**K, **362**C, **362**M, and **362**Y occurring due to heat-carrying sheets being transported through the sheet transport device **91** may be prevented.

Referring back to FIGS. **4** to **7**, the description of the image forming unit **8** in the image forming apparatus **7** will continue below.

As shown in FIGS. **5** and **7**, the loading plate **821** has an opening **821***a* extending therethrough from the top surface to the undersurface thereof, and a lid **821***b* that blocks the opening **821***a* at the underside thereof and is opened by being pressed from above. For example, the lid **821***b* is biased in the closing direction by a spring (not shown) and is opened

against the bias force when the lid **821***b* receives a downward pressing force from a claw member **822***a*, to be described below.

FIG. **9** is a perspective view of the auxiliary loading member **822**, as viewed at an angle from below.

As shown in FIGS. **5** and **9**, the auxiliary loading member **822** has the claw member **822***a* that protrudes toward the underside of the loading plate **821** by pressing the lid **821***b* when the auxiliary loading member **822** is installed on the loading plate **821**.

As shown in FIG. **5**, when the auxiliary loading member **822** is installed on the loading plate **821**, the claw member **822***a* protrudes toward the underside of the loading plate **821**. Thus, air from the air blower **823** is guided to an area between the loading plate **821** and the auxiliary loading member **822** by the claw member **822***a*. As a result, the air is blown out from the air holes **8221***a* formed in the side portions **8221** of the auxiliary loading member **822**. In other words, when the auxiliary loading member **822** is installed on the loading plate **821**, the air blower **823** cools a sheet output by the pair of output rollers **333** and loaded onto the output tray **82**. Consequently, the occurrence of sheet blocking may be prevented. The air blower **823** corresponds to an example of a cooling unit according to an exemplary embodiment of the present invention. The claw member **822***a* itself may serve as the component that changes the air flowing direction so as to guide the air from the air blower **823** to the area between the loading plate **821** and the auxiliary loading member **822**. As another alternative, the lid **821***b* that receives a downward pressing force from the claw member **822***a* may serve as the component that changes the air flowing direction so as to guide the air from the air blower **823** to the area between the loading plate **821** and the auxiliary loading member **822**.

For preventing the occurrence of sheet blocking, a dedicated air blower for blowing air out from the air holes **8221***a* is not necessary in the image forming apparatus **7** according to the second exemplary embodiment.

The description of the image forming apparatus **7** according to the second exemplary embodiment of the present invention ends here.

The foregoing description of the exemplary embodiments of the present invention has been provided for the purposes of illustration and description. It is not intended to be exhaustive or to limit the invention to the precise forms disclosed. Obviously, many modifications and variations will be apparent to practitioners skilled in the art. The embodiments were chosen and described in order to best explain the principles of the invention and its practical applications, thereby enabling others skilled in the art to understand the invention for various embodiments and with the various modifications as are suited to the particular use contemplated. It is intended that the scope of the invention be defined by the following claims and their equivalents.

What is claimed is:

1. An image forming apparatus comprising:

a housing;

an image forming section that is provided within the housing and that is configured to form an image onto a recording medium;

an output section configured to output the recording medium, having the image formed thereon by the image forming section, outward from the housing;

a loading section configured such that the recording medium output from the output section is loaded on the loading section,

wherein the loading section comprises an air hole; and

a cooling unit configured to allow air to flow between an interior of the housing and the loading section via the air hole so as to cool a surface, which faces the loading section, of the recording medium loaded on the loading section,

wherein the loading section includes a reference surface and a protrusion that protrudes from the reference surface and that has a receiving surface configured to receive the output recording medium,

wherein the air hole is provided in a surface of the protrusion that is different from the receiving surface,

wherein the image forming apparatus is configured such that the output recording medium is loaded in a state where a portion of the output recording medium protrudes from the receiving surface so that a surface, which faces the loading section, of the protruding portion is cooled,

wherein the loading section further has a recess that is provided at a side of the protrusion and that is recessed from the reference surface, and

wherein a cooling flow path is ensured by positioning an edge of the recording medium loaded on the loading section within the recess so that the air flowing via the air hole travels between the edge of the recording medium and the recess.

2. The image forming apparatus according to claim **1**,

wherein the cooling unit is provided at an underside of the loading section.

3. An image forming apparatus comprising;

a housing;

an image forming section that is provided within the housing and that is configured to form an image onto a recording medium;

an output section configured to output the recording medium, having the image formed thereon by the image forming section, outward from the housing;

a loading section configured such that the recording medium output from the output section is loaded on the loading section,

wherein the loading section comprises an air hole; and

a cooling unit configured to allow air to flow between an interior of the housing and the loading section via the air hole so as to cool a surface, which faces the loading section of the recording medium loaded on the loading section,

wherein the loading section has a loading plate and an auxiliary loading member that at least includes the air hole and that is attachable to and detachable from the loading plate,

wherein a loading surface of the loading section is formed by the auxiliary loading member and an area on an upper surface of the loading plate that is located away from the auxiliary loading member,

wherein if the image forming apparatus is configured to be connected to a post-processing device that performs post-processing on the recording medium having the image formed thereon by the image forming section, a transport device that transports the recording medium output from the output section toward the post-processing device is connected to the loading plate,

wherein if the image forming apparatus is not connected to the post-processing device, the auxiliary loading member is connected to the loading plate,

wherein if the transport device is connected to the loading plate, the cooling unit cools the interior of the housing, and

wherein if the auxiliary loading member is connected to the loading plate, the cooling unit allows the air to flow via the air hole provided in the auxiliary loading member so as to cool the surface, which faces the loading section, of the recording medium loaded on the loading section.

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